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ELECTRIC VEHICLE CHARGING STATIONS

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STATUTORY DEFINITIONS

By law, an electric vehicle charging station is an electric component assembly or cluster of component assemblies designed specifically to charge an electric vehicle battery by transferring electric energy to a battery or a storage device in the vehicle.

A public electric vehicle charging station is a charging station located at a publicly available parking space (e.g., one that has been designated by a property owner or lessee as available to the public).

(CGS § 16-19f as amended by PA 16-135)

ISSUE

This report describes different types of electric vehicle (EV) charging stations. It also discusses recent state and federal legislation and policy initiatives related to EV stations.

SUMMARY

EV charging stations are generally classified into one of three categories based on the rate at which they charge the vehicle's battery.

According to a federal report analyzing past projects, prices for the stations, also known as electric vehicle supply equipment (EVSE), have ranged from $300 to $40,000, with installation costs ranging from $0 to $51,000. EV owners who charge at home generally pay for the charging on their electricity bill. Public stations have a variety of payment methods.

The Department of Energy and Environmental Protection (DEEP) has offered funding to municipalities, state agencies, and private businesses for EV charging stations. Connecticut is also one of the Multi-State ZEV Task Force's eight member states.

There are at least 282 public EV charging stations in Connecticut. Last session, PA 16-135 established requirements for public EV charging stations. Recent federal legislation required the U.S. Transportation Secretary to designate national electric vehicle charging corridors (i.e., portions of major national highways with EV charging stations at or needed in strategic locations to improve EV mobility). Connecticut's Department of Transportation has nominated several segments of highway, including I-91, I-95, I-84, and I-395.

CHARGING EQUIPMENT CLASSIFICATIONS

EV charging stations are also known as electric vehicle supply equipment (EVSE). Table 1 describes common classifications for EV charging. The alternating current (AC) electricity delivered to these stations from power lines must be converted to direct current (DC) before a car's batteries can store it. AC charging relies on the vehicle to convert the power from AC to DC. DC fast charging relies on the charger to make the conversion.

Table 1: Common EV Charging Classifications

Classification	*Description*	*Range*	*Notes*
AC Level 1 EVSE (i.e., Level 1)	• includes a cord and connector • charges through a common 120 volt three-prong household plug	2-5 miles for one hour of charging	Plug-in vehicles come standard with Level 1 EVSE.
AC Level 2 EVSE (i.e., Level 2)	• uses the same connector and charge port as Level 1 • requires a 240 volt or 208 volt electrical service	10-20 miles for one hour of charging	EV owners can install 240 volt service for home charging.
DC Fast Charging	• provides DC electricity to the battery directly through a special charging port • mainly used for in-transit charging rather than home charging	50-70 miles for 20 minutes of charging	The type of DC fast charging system will vary depending on the charge port on the vehicle. EVs that use DC charging generally have one of three different ports.

Source: U.S. Department of Energy (DOE), Alternative Fuels Data Center (AFDC)

Table 1 does not include "supercharging," which is a type of DC charging specific to Tesla vehicles.

Charging stations can be installed for homes or in non-residential settings. Non-residential charging stations may be publicly available or their use may be restricted (e.g., for employees only).

COSTS

Units and Installation

According to a 2015 DOE report, the potential range of costs for units and installation of non-residential single port EV chargers are as follows:

- Level 1: $300-$1,500 for the unit and $0-$3,000 for installation;
- Level 2: $400-$6,500 for the unit and $600-$12,700 for installation; and
- DC fast charging: $10,000 -$40,000 for the unit and $4,000-$51,000 for installation.

The above estimates are ranges based on past projects and should not be used for estimating individual project costs. (The $0 installation cost for Level 1 EVSE assumes the site already has an outlet for EV users to plug in their Level 1 cord sets and that the outlet already has a dedicated circuit.) The report notes that although the cost of EVSE units is trending downward, installation costs are highly variable and there is no industry consensus on their future direction. Other costs include operation and maintenance, warranties, and land costs.

Charging

Whether an EV owner plugs the EV directly into a household plug with Level 1 equipment or installs a Level 2 EVSE, the cost of home charging is generally reflected on the ratepayer's electric bill.

The cost of EV charging at a non-residential charging station depends on choices the charging station host makes. Businesses that install EVSE may, for example, allow employees to charge their EVs for free and charge a fee for visitors. According to the DOE report, EVSE that are part of a charging network may have various driver payment models, including monthly subscriptions, pay-as-you-go or pay per charge, or free service. A charging network is a group of EVSE units with access control and payment systems managed by a single organization.

Charging stations may include additional features to enable sales, such as point of sale functionality (e.g., a credit card reader or mobile phone application enabling payments) and communications capabilities to share data with users, owners, the electric grid, and other parties.

LOCATIONS IN CONNECTICUT

According to DEEP, there are at least 282 publicly available charging stations as of November 2016. DEEP's map of charging station locations also includes information on their operating hours.

STATE INITIATIVES

Funding

DEEP offers various incentives for EV charging stations. DEEP's incentives include funding for EV charging stations for municipalities, state agencies, and private businesses. Funding for these incentives generally comes from the (1) 2012 merger between NSTAR and Northeast Utilities and (2) Regional Greenhouse Gas Initiative. According to DEEP, the incentive programs have gone through several rounds of funding but are not currently taking applications. DEEP also provides information related to EV charging stations (e.g., siting and design guidelines) on its website.

Multi-State Zero Emissions Vehicles (ZEV) Task Force

Connecticut is one of eight member states of the Multi-State ZEV Task Force. Member states have signed a memo of understanding committing to, among other things, coordinate vehicle and fueling station equipment procurement and provide public access to government fleet fueling stations. ZEVs include battery-electric vehicles, plug-hybrid electric vehicles, and hydrogen fuel cell electric vehicles. The Multi-State ZEV action plan, published in 2014, also includes initiatives to promote workplace charging. More information is available at the task force website.

RECENT STATE LEGISLATION

Last session, PA 16-135 established requirements for public EV charging stations. Among other things, the act requires station owners or operators to disclose the stations' locations and characteristics, including the address, voltage, and timing restrictions, to the federal database operated by the DOE's Alternative Fuels Data Center.

Under the act, station owners or operators who require users to pay a fee must provide multiple payment options that allow public access and they cannot charge subscription fees or require membership in any club, association, or organization as a condition of using the station. But they can have different price schedules based on such a subscription or membership.

The act prohibits anyone from parking in a publicly available parking space for an EV charging station, except for those operating plug-in hybrid vehicles or battery electric vehicles. It allows station owners and operators to restrict the length of time that an EV may be charged at the station.

By law, various weight and measurement devices must be registered annually with the consumer protection commissioner, who must charge registration fees. Under the act, public EV charging stations must be registered annually with the commissioner, who must collect a $50 registration fee.

For more information on the act's other provisions, see the OLR Public Act Summary.

RECENT FEDERAL LEGISLATION

Among other things, the federal Fixing America's Surface Transportation (FAST) Act required the U.S. Transportation Secretary to designate national EV charging corridors and solicit nominations from state and local officials for stations to be included in the corridors (P.L. 114-94 § 1413). For more information on other provisions of the FAST Act, see OLR Report 2016-R-0001.

In practice, the U.S. Department of Transportation's Federal Highway Administration (FHWA) has designated alternative fuel corridors where alternative fuel stations, including EV charging stations, are available. Routes identified by Connecticut's Department of Transportation as "signage ready" are:

1. I-95 from the Rhode Island border to the New York border,
2. I-91 from the Massachusetts border to New Haven,
3. I-84 from the New York border to the Massachusetts border, and
4. I-395 from Waterford to the Massachusetts border.

According to FHWA, "signage ready" sections of highway have publicly available EV charging stations, including DC fast charging and Level 2 charging, that are within five miles of the highway with 50 miles between stations. FHWA intends to develop national signage and branding for these corridors.

RESOURCES

U.S. Department of Energy: Costs Associated with Non-Residential Electric Vehicle Supply Equipment, November 2015.

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